THERE IS CLAIMED:

1. A packet router for optical transmission networks, said router including input ports for receiving packets and for transmitting them in optical form with carrier wavelengths in corresponding relationship to said input ports, said router further including an input system for applying time-delays to said packets and broadcasting them to spatial selector systems for receiving said packets and transmitting them to spectral selector systems, all said systems making selections from said packets on command, said spectral selector systems making said selections in accordance with predetermined spectral assemblies, each of said assemblies having at least one wavelength and including the packets having a carrier wavelength equal to a wavelength of said assembly, each of said packets being included in one of said assemblies, and said router transmitting at its output packets obtained from said selections,

   in which router said input system includes a single time-delay system and said input system cooperates with said input ports to divide said packets into a plurality of groups each consisting of some of said packets, the number of said packet optical carrier wavelengths of each of said groups being a fraction of the number of said input ports and constituting a number of wavelengths of said group, said cooperation being such that the number of said spectral assemblies in accordance with which said spectral selector systems make said selections is equal to the greatest of said numbers of wavelengths of said groups.

2. The packet router claimed in claim 1, adapted to be included in a data transmission network for routing respective signals constituting said packets, each of said packets conveying information to be transmitted and being provided with a routing label, said packet being adapted to be conveyed by optical waves having respective wavelengths, said wavelength of an optical wave conveying said packet constituting said carrier wavelength of said packet, and said router having a plurality of operating wavelengths and including:

   - a plurality of said input ports, each of said input ports being assigned one of said operating wavelengths and being disposed to receive said packets in succession in time,

   - an input multiplexer system disposed to receive said packets at outputs of said input ports, said system having at least one output and being adapted to transmit to each output of said system said packets having respective different carrier wavelengths received by said system,

   - a time-delay system disposed to receive said packets at the output of said

input multiplexer system, said time-delay system having an assembly of outputs respectively constituting primary internal terminals, said terminals having respective time-delays, and said time-delay system being adapted to transmit each of said packets to each of said terminals with a time-delay equal to said time-delay of said terminal,

- a broadcaster system for connecting each of said primary internal terminals to a plurality of distribution terminals each having a time-delay consisting of said time-delay of said primary internal terminal, said input multiplexer system, said time-delay system and said broadcaster system constituting said input system, and said input system cooperating with said input ports to form connections for connecting said ports to said distribution terminals,

- a plurality of selector units, each of said units having a plurality of inputs, said inputs consisting of a plurality of said distribution terminals and being assigned said time-delays of respective terminals, said connections being such that, for each of said units, each of said packets received by one of said ports is transmitted by one of said links of said port to one of said inputs of said unit, said unit being adapted to receive selection instructions designating it, each of said instructions further designating one of said input ports and one of said inputs of said block, said block being adapted to respond to each of said instructions by selecting one of said packets received at one of its inputs, said carrier wavelength of said selected packet being said wavelength of the input port designated by said instruction and said input being said input of said block designated by said instruction, said unit having an output constituting an output port of said router, and said unit being adapted to transmit said selected packet to said output and to this end including:

- a distribution terminal selector having, on the one hand, a plurality of inputs respectively consisting of said inputs of said block and, on the other hand, an output, and said selector constituting one of said space selector systems and being adapted to receive those of said selection instructions that designate said selector units and to respond to each such instruction by connecting said output to that of said inputs that is designated by that instruction, and

- a wavelength selector having an input consisting of said output of said distribution terminal selector, said wavelength selector having an output constituting said output of said selector unit and said selector constituting one

of said spectral selection systems and being adapted to receive those of said selection instructions that designate said selector units and to respond to each such instruction by selectively transmitting from its input to its output that of said packets whose carrier wavelength is the wavelength of the input port designated by said instruction,

said router further including a management unit sensitive to said routing labels and to traffic data received from said transmission network, said unit being adapted to respond to said routing label of each of said packets received by said router by sending a selection instruction concerning said packet and said instruction designating that of said input ports which received said packet and further designating in accordance with said traffic data at least one of said selector units and one of said inputs of said unit,

in which router said connections formed by said input system in cooperation with said input ports, on the one hand, divide all of said input ports into a plurality of input groups each consisting of a plurality of said ports and, on the other hand, divide all of said distribution terminals into a plurality of internal groups respectively associated with said input groups and each including at least one such terminal, said wavelengths of the ports of each of said input groups forming a succession of different wavelengths respectively specific to a succession of said ports, said distribution terminals of each of said internal groups constituting terminals of said group, the respective time-delays of said terminals being different and forming a succession of time-delays of said internal group, and said divisions being effected by virtue of the fact that said connections connect the ports of one of said input groups only to the terminals of said internal group associated with said input group and connecting said terminals only to said ports.

3. The packet router claimed in claim 2, wherein the absolute value of the difference between each of the respective numbers of ports included in said input groups and the ratio of the terminal number of input ports to the number of said groups is less than said number of groups.
4. The packet router claimed in claim 3, wherein said number b of said input groups is at least equal to 2 and at most equal to 64.
5. The packet router claimed in claim 4, wherein said number b of said input groups is the greater of two numbers, a first of said two numbers being from 25% to 400% of the square root of the ratio of said number n of said input ports to said number k of time-delays of said succession of time-delays, a second of

said two numbers being equal to said number n divided by 16.

6. The packet router claimed in claim 2 wherein all said internal groups have the same succession of time-delays.

7. The packet router claimed in claim 2 wherein said wavelengths of said input ports included in each of said input groups form a spectral succession consisting of different wavelengths and at least a majority of the wavelengths of said succession is included in said spectral succession of each of said other input groups,

said input multiplexer system including an input multiplexer for each of said input groups, said multiplexer constituting a multiplexer of said group and being disposed to receive and wavelength division multiplex said packets transmitted by said ports of said group, and said multiplexer having an output for transmitting said multiplexed packets,

said time-delay system including, for each of said input groups, a time-delay unit for receiving said multiplexed packets transmitted by said output of said multiplex of said group and said unit having for each of said time-delays a primary internal terminal assigned said time-delay,

said broadcaster system including, for each of said time-delays and for each of said time-delay units, a broadcaster connecting said primary internal terminal assigned said time-delay to a plurality of said distribution terminals assigned said time-delay, and said broadcaster constituting a broadcaster of said primary internal terminal,

said inputs of each of said selector units including a group of said inputs for each of said input groups, each of said groups of inputs of said unit including one of said inputs for each of said primary internal terminals, and said input consisting of one of said secondary internal terminals and being connected to said primary internal terminal via said diffuser of said primary internal terminal.

8. The packet router claimed in claim 2 wherein said wavelengths of said input ports form a spectral succession consisting of different wavelengths,

said input multiplexer system including a multiplexer disposed to receive and wavelength division multiplex said packets transmitted by said input ports and said system having an output for transmitting said multiplexed packets,

said time-delay system including a single time-delay unit disposed to receive said multiplexed packets, said unit having for each of said time-delays one of said primary internal terminals having said time-delay,

said broadcaster system including:

- a plurality of broadcasters each having one input and a plurality of outputs and each connecting said input to each of said outputs, and

- a plurality of spectral splitters, each of said splitters having an input and a plurality of outputs and being disposed to receive on said inputs said multiplexed packets, said outputs being respectively associated with groups of wavelengths consisting of respective fractions of said plurality of operating wavelengths, said successive fractions being the same for all said splitters, each of said splitters being adapted to transmit to each of said outputs only one group of said packets, and said group consisting of said packets having one of said carrier wavelengths included in said group of wavelengths associated with said output,

each of said distribution terminals being connected to one of said primary internal terminals by said broadcaster system via one of said spectral splitters and at least one of said broadcasters, and

said inputs of each of said selector units including a group of said inputs of each of said groups of wavelengths, each of said groups of inputs of said block including one of said inputs for each of said primary internal terminals, said input consisting of one of said distribution terminals and being connected to said primary internal terminal via said broadcaster system,

whereby, for each of said groups of wavelengths, one of said input groups consists of all of said input ports assigned a wavelength included in said group of wavelengths and one of said internal groups consists of all of said distribution terminals connected to said primary internal terminals via those of said outputs of said spectral splitters that are associated with said group of wavelengths.

9. The packet router claimed in claim 8 wherein said input of each of said spectral splitters consists of a primary internal terminal.

10. The packet router claimed in claim 8 wherein said operating wavelengths form a substantially regular succession, each of said wavelengths having a rank in said succession, said groups of wavelengths forming a succession including a number b of said groups, and each of said groups having a rank in said succession, and wherein at least some of said groups of wavelengths each include a plurality of said operating wavelengths such that the rank r of said group and the rank q of each of said wavelengths satisfy the following condition:

$$r = q \text{ modulo } b.$$

11. The packet router claimed in claim 8 wherein said wavelength selector of each

of said selector units includes:

- at least one spectral splitter having, on the one hand, a common terminal and, on the other hand, a plurality of particular terminals constituting wavelength terminals respectively associated with at least some of said operating wavelengths, said splitter being adapted to transmit selectively between said common terminal and each of said wavelength terminals those of said packets whose carrier wavelength is associated with said terminal, and

- a wavelength terminal selector having at least one plurality of terminals respectively consisting of said wavelength terminals of a spectral splitter and said selector being adapted to receive one of said selection instructions designating said selector unit and one of said input ports and to respond to said instruction by enabling the selective transmission of said packets via at least one of said terminals of said selector associated with said wavelength of said port, and wherein each of said spectral splitters of said wavelength selector is a band splitter, said spectral splitters of said broadcaster system being periodic splitters.

12. The packet router claimed in claim 8 wherein said operating wavelengths form a substantially regular succession, each of said wavelengths having a rank in said succession, said groups of wavelengths forming a succession including a number b of said groups, and each of said groups having a rank in said succession, and wherein at least some of said groups of wavelengths each include a plurality of said operating wavelengths such that the rank r of said group and the rank q of each of said wavelengths satisfy the following condition:

$$r = 1 + \text{integer part of } [(q-1)/(n/b)].$$

13. The packet router claimed in claim 8 wherein said wavelength selector of each of said selector units includes:

- at least one spectral splitter having, on the one hand, a common terminal and, on the other hand, a plurality of particular terminals constituting wavelength terminals respectively associated with at least some of said operating wavelengths, said splitter being adapted to transmit selectively between said common terminal and each of said wavelength terminals those of said packets whose carrier wavelength is associated with said terminal, and

- a wavelength terminal selector having at least one plurality of terminals respectively consisting of said wavelength terminals of a spectral splitter, said selector being adapted to receive one of said selection instructions designating

said selector unit and one of said input ports and to respond to said instruction by enabling the selective transmission of said packets via at least one of said terminals of said selector associated with said wavelength of said port,

and wherein each of said spectral splitters of said wavelength selector is a periodic splitter, said spectral splitters of said broadcaster system being band splitters.

14. The packet router claimed in claim 2 wherein said distribution terminal selector of each of said selector units includes:

- a succession of optical switches having respective inputs respectively constituting said inputs of said selector unit, said switches having respective outputs respectively constituting orientation outputs, and said inputs being respectively associated with said outputs, and

- combiner systems forming connections for respectively connecting said orientation outputs to said output of said selector,

and wherein said combiner systems include switched amplifiers, each of said switched amplifiers being connected at the input at least indirectly to some of said orientation outputs, said outputs and said inputs associated with said outputs constituting an upstream group of said amplifier, said group including a plurality of said outputs and excluding another plurality of said outputs, and said switched amplifiers being controlled by said selection instructions so that the gain of each of said amplifiers is temporarily increased if one of said inputs of said upstream group of said amplifier is designated by one of said instructions.

15. The packet router claimed in claim 14 wherein at least some of said connections formed by said combiner systems each include a serial succession of several of said switched amplifiers each having a plurality of inputs and a single output, said inputs respectively belonging to a plurality of said connections, at least two of said amplifiers being consecutive in said succession and respectively constituting a preceding amplifier and a following amplifier, and said output of said preceding amplifier constituting one of said inputs of said following amplifier.

16. The packet router claimed in claim 8 including a single primary internal terminal, said time-delay of said terminal being nil.